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or Innovation

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I the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1985 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed P L Behan

Dated 2 October 2006

Patents Form 1/77

Patents Act 1977
(Rule 16)

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

15 MAR 2004

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference

AJL/IR/P5433

2. Patent application number
(The Patent Office will fill this part in)

0405799.8

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Wind Save Limited,
27 Woodside Place,
Glasgow.
G3 7QL
UK

Patents ADP number *(if you know it)*

8755449 001

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

Renewable Energy Resources

5. Name of your agent *(if you have one)*

~~ROYSTONS~~ Marks & Clerk

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Tower Building,
Water Street,
Liverpool. L3 1BA
Merseyside.

Patents ADP number *(if you know it)*

1438001

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application	Date of filing *(day / month / year)*

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

YES

Answer YES if:

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form	
Description	7
Claim(s)	-
Abstract	-
Drawing(s)	4

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	
Request for a preliminary examination and search (Patents Form 9/77)	
Request for a substantive examination (Patents Form 10/77)	
Any other documents (please specify)	

11. I/We request the grant of a patent on the basis of this application.

Signature(s) ROYSTONS – Authorised Agents Date 15-3-04

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

A. J. Lyons TEL: – 0151-236 5147/1417

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered YES in part 8, a Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) Part 7 should only be completed when a divisional application is being made under section 15(4), or when an application is being made under section 8(3), 12(6) or 37(4) following an entitlement dispute. By completing part 7 you are requesting that this application takes the same filing date as an earlier UK application. If you want the new application to have the same priority date(s) as the earlier UK application, you should also complete part 6 with the priority details.

Title: Renewable Energy Resources

Description

This invention concerns renewable energy resources.

Wind energy has great potential as a renewable energy source. A recent report examining different renewable energy resources found that a total of 60GW of cost effective renewable energy was available with the top two sources in terms potential being offshore wind (25GW) and wave energy (14GW). The next largest source of renewable energy is onshore wind (12GW).

Currently wind power is used to generate electrical energy for the national grid. That requires large-scale commercial wind farms but they are expensive to set up due to the high cost of the generators required.

In our earlier patent application WO 03/067801 a system was proposed for generating electrical power for an individual property comprising a wind powered electricity generator mounted on that property and arranged so that electrical power generated be used in that property in preference to or to supplement electrical power provided by the national grid or other general electrical energy.

In other words, when there is sufficient wind power to generate electrical energy for an individual property's demands, that electrical energy be used rather than the electricity supplied by the national grid. In that way the drain on the resources of the national grid can be cut, so that national supply costs can also be reduced.

It was, therefore, proposed that an individual property have at least one wind powered generator, such as a wind vane or vanes, mounted in a suitable position on the property exposed to the prevailing wind. The wind vane preferably comprised at least one multi-bladed rotor that drives an electricity generator.

The present invention now proposes improvements to that system.

According to a first aspect of the invention there is provided a wind generator arrangement for use in generating electrical power, the arrangement comprising a plurality of wind generators in at least two rows, wherein generators of any one row are at a different height to those of adjacent rows and/or a wind generator of one row is offset relative to any wind generators of an adjacent row.

The arrangement of this aspect of the invention is to avoid operation of each wind generator being adversely affected by air currents produced by operation of adjacent generators.

Preferably each wind generator will be mounted on a height adjustable pole, such as a telescopic pole. Preferably the wind generators are mounted on a platform that is itself mountable on a roof or other suitable structure.

Preferred wind generators for use in the invention initially produce A.C electrical power and one preferably linked to means for converting that A.C into A.C compatible with the A.C. provided to the building

According to another aspect of the invention there is provided means for converting electrical power generated by one or more wind generators

into A.C. suitable for use in providing electrical power for a building to supplement or replace electrical power supply from the national grid.

The means according to this aspect of the invention preferably takes the A.C. current produced by the wind generators through a full wave internally or externally mounted rectifier to convert it to D.C. From the rectifier, the D.C. is preferably converted to square wave A.C., such as by means of a chopper circuit also known as an H bridge. This A.C. is preferably then converted to sine wave A.C., such as by means of a constant voltage transformer. This A.C. is preferably compatible with the A.C. supply from the normal utility supplier to the building. The means for converting the D.C to A.C. preferably has means for ensuring that the A.C. produced is in phase with the A.C. supply normal utility supplier to the building.

Preferably the means for converting electrical power generated by one or more wind generators into A.C. suitable for use in providing electrical power for a building to supplement or replace electrical power supply from the national grid is provided in a box or case to which the wind generators can be connected and which itself can be connected into the electrical circuitry of the building to feed the load thereon.

This invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:

Figures 1 and 2 are schematic diagrams of a wind generator arrangement for mounting on a roof;

Figure 3 shows a wind generator for use in the arrangement of Figures 1 and 2;

Figure 4 shows schematically a control system for converting wind generated electrical power into A.C. for use in a building; and

Figure 5 shows schematically a control system of the invention.

Referring to Figures 1 and 2 of the accompanying drawings, an arrangement 10 of wind generators 12 for mounting on a roof for use in generating electrical power comprises a platform 14 supported on legs 16, one at each corner. The legs are of adjustable length and angle to suit the location, where the platform is to be mounted.

The wind generators 12 are mounted on poles 18 at spaced intervals. The poles are height adjustable by being telescopic. There are two rows 20 and 22 of wind generators.

It is important that to reduce interference between the rows of generators the generators of the one row be staggered relative to the generators of the other row. Thus, the generators of the rear row 22 are positioned between the generators of the front row 20 as viewed from the front and are also higher than the wind generators of the front row. Thus, viewed from the front none of the generators overlaps with another generator. This reduces the impact of air currents produced by one generator affecting the operation of adjacent generators.

Figure 3 of the accompanying drawings shows a typical wind generator 12 for use in the arrangement of Figures 1 and 2. The generator 12 is mounted on a pole 18 and is allowed to rotate through 360°. The generator has three blades 30 on a horizontal axis that are aerodynamically shaped to be caused to rotate on the axis to generate electrical power. The

generator has a tail fin 32 that causes the generator to swivel to a position where the blades are facing into the prevailing wind.

A start-up speed of 3mph [1.3m/sec] will generate ~100W whilst a wind of 27mph [12m/sec] delivers the optimum rating of ~750W using 1.0m dia. blades and 1.2kW using 1.4m dia. blades. In gale force conditions [over 34mph] a cut-off device prevents damage from over-fast rotation.

Turning to Figure 4 there is shown a typical control system for converting electrical power generated by the arrangement of Figure 1 into electrical power that can be used to supplement or replace electrical power supplied to a building from the normal utility supply. The wind generator arrangement 10 produces an A.C. electrical current, which is fed through a full wave rectifier 50 to convert it to D.C. and then through a chopper circuit 52 to produce 50Hz square wave A.C. Across the chopper 52 is a voltage detector 54 linked to a variable tap switch unit 56 prior to a constant voltage transformer 58 that produces A.C. at 240 volts and 50 Hz in sine wave form. The output from the constant voltage transformer 58 is passed through a meter 60 before being fed to the power supply for the building 62, where it joins the power supply from the normal utility supply 64 after the usage meter 66 therefor.

It is important that the A.C. supply from the wind generators is in phase with the national grid A.C. supply. Therefore, a feedback loop for phase angle detection 70 is provided between the wind generator generated electricity supply and the chopper circuit 52, whereby the chopper circuit is controlled to produce A.C. of the correct phase.

In practice, as illustrated in Figure 5 of the accompanying drawings, the means for converting the D.C output of the wind generators 12 will be fed to a portable control box 80 containing the components described above for converting the D.C. output into A.C. output. The control box 80 has a carrying handle 82 and can be plugged directly into a socket of the building's electrical circuit by means of electrical plug 84 to at least partially feed the load of the building. The control box includes a wattmeter 86. Thus, the electricity power generator system may be installed relatively easily by siting the wind generators in an exposed position, especially on a roof, connecting the electricity supply therefrom to the control box 70 and connecting that into the electricity circuit of the building via a mains socket.

It is proposed that a sensor be provided on the incoming mains electricity supply that measures wattage or in other words what the grid is supplying to the household need. The sensor is arranged to communicate with the control box 80, so that if the import wattage falls to a predetermined level, say of 20 watts, the control unit can be instructed to reduce efficiency to prevent actual export of power back to the grid. As the import wattage increases to say 50 watts due to decreased efficiency or reduced wind power, the control unit improves efficiency to a level, whereby the predetermined levels are maintained or the maximum wind power is used.

When mains power fails, the control unit has to disconnect and shut down. However, if stand alone wind power electricity supply is required, the control unit may be disconnected from mains supply to be allowed to operate independently. An isolating switch may be provided, which can be automatically or mechanically operated to allow the control unit to provide

stand alone power and feed whatever power it can from the wind to be used by the household. The control unit is provided with means for detecting when mains power is restored, which either may provide a signal to indicate that reconnection of the control unit can take place or even automatically reconnect the control unit.

The control unit is preferably arranged, so that there is no possibility of excess power being fed back to the grid. Thus, the control unit is preferably arranged to supply slightly less power than the household demand.

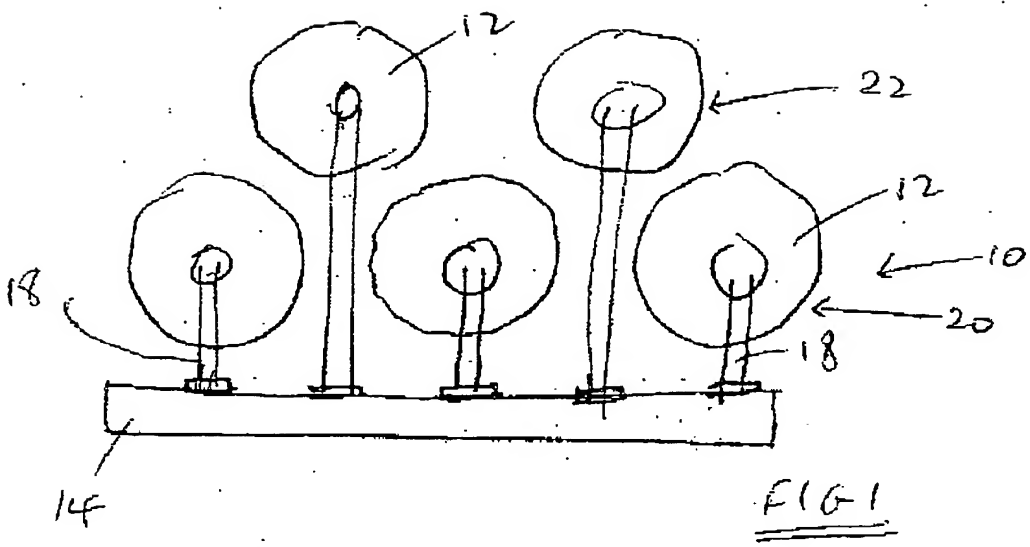


FIG 1

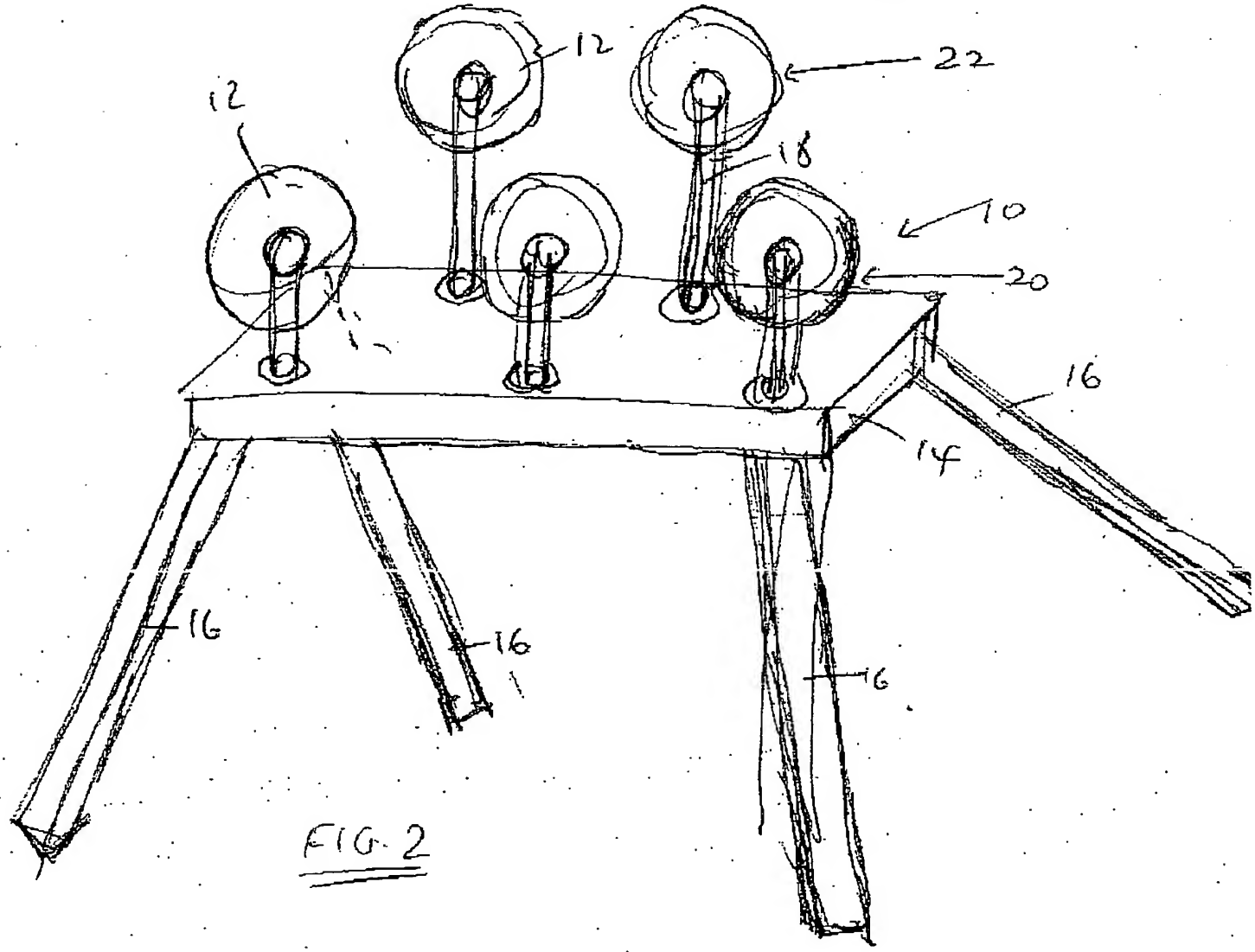


FIG. 2

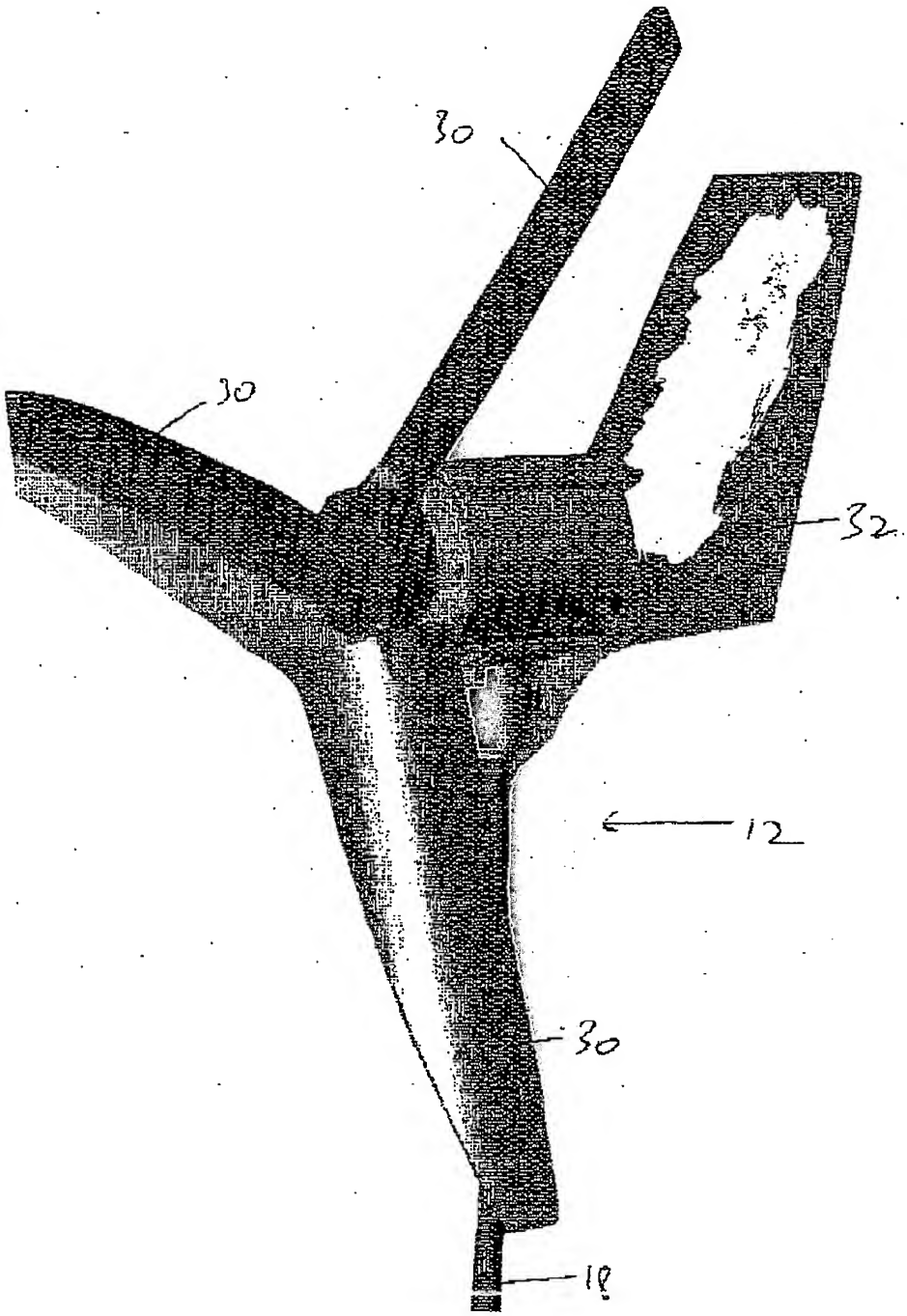
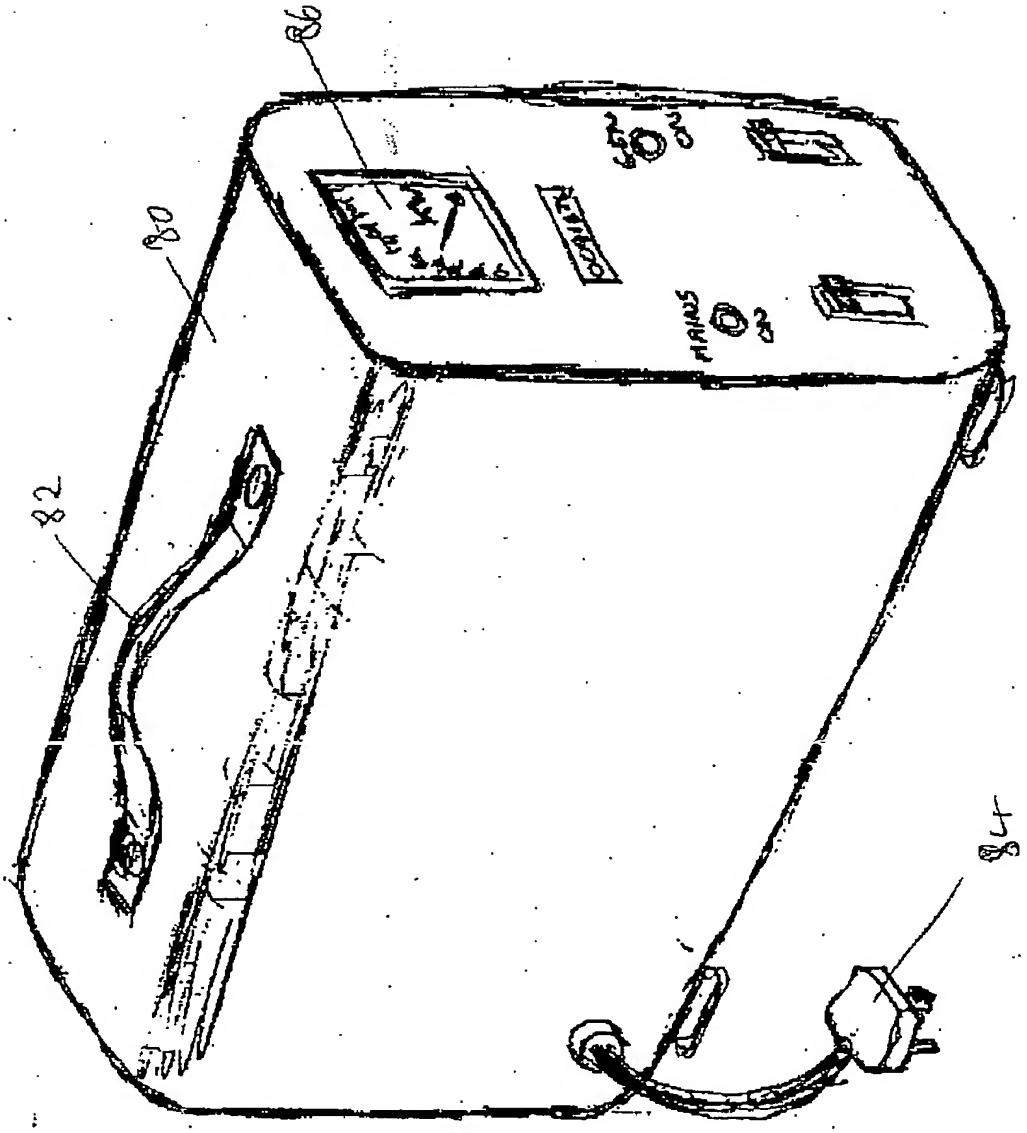


FIG 3

FIG 5



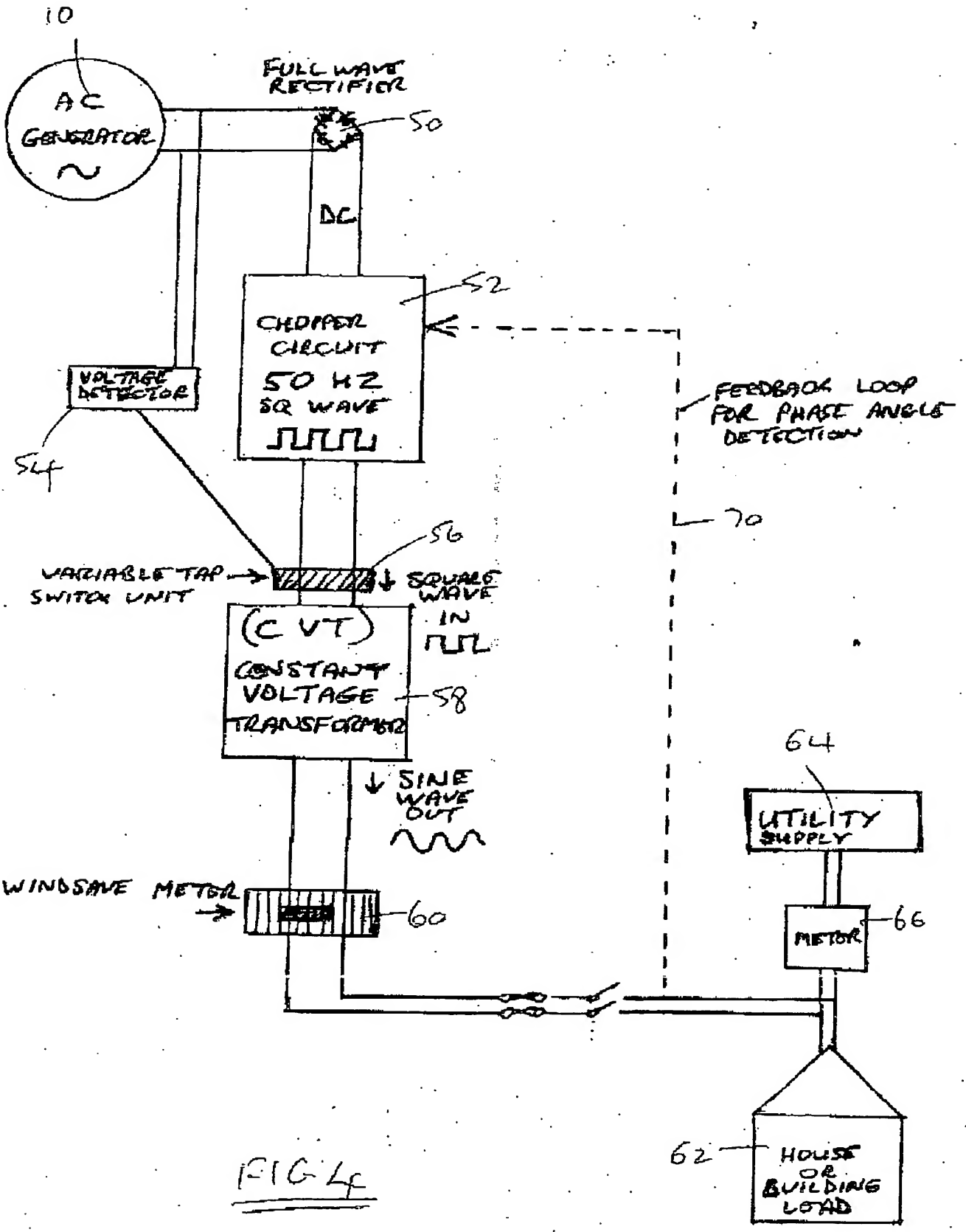

10
AC GENERATOR
FULL WAVE RECTIFIER
50
DC
52
CHOPPER CIRCUIT
50 HZ SQ WAVE
VOLTAGE DETECTOR
54
FEEDBACK LOOP FOR PHASE ANGLE DETECTION
70
56
VARIABLE TAP SWITCH UNIT
SQUARE WAVE IN
(CVT)
CONSTANT VOLTAGE TRANSFORMER
58
SINE WAVE OUT
64
UTILITY SUPPLY
WINDSAVE METER
60
METER
66
62
HOUSE OR BUILDING LOAD

FIG 4

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